Thesaurus of Terms Used in Microbiological Risk Assessment

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5.5 EXPOSURE TERMS

absorbed dose

1) The amount of a substance penetrating across an absorption barrier (the exchange boundaries) of an organism, via either physical or biological processes. Sometimes called internal dose. (EPA 1992)
2) The amount crossing a specific absorption barrier (e.g., the exchange boundaries of skin, lung, and digestive tract) through uptake processes. (EPA 2005b)
3) The amount of a substance absorbed into the body, usually per unit of time. The most common unit of dose is mg per kg body weight per day (mg/kg-day). (RAIS 2004, SRA 2004)

RELATED TERMS: dose

absorption barrier

Any exposure surface that may retard the rate of penetration of an agent into a target. Examples of absorption barriers are the skin, respiratory tract lining, and gastrointestinal tract wall (see also *Exposure surface*). (IPCS 2004)

activity pattern data

Information on human activities used in exposure assessments. These may include a description of the activity, frequency of activity, duration spent performing the activity, and the microenvironment in which the activity occurs. (IPCS 2004)

acute exposure

1) Exposure by the oral, dermal, or inhalation route for 24 hours or less. (EPA 2003)
2) One dose (or exposure) or multiple doses (or exposures) occurring within a short time relative to the life of a person or other organism (e.g., approximately 24 hours or less for humans). (EPA 2004)
3) A single exposure to a toxic substance that results in severe biological harm or death. Acute exposures are usually characterized as lasting no longer than a day, as compared to longer, continuing exposure over a period of time. (EPA 2005b, RAIS 2004)
4) Contact with a substance that occurs once or for only a short time (up to 14 days). (ATSDR 2004)
5) A contact between an agent and a target occurring over a short time, generally less than a day. (Other terms, such as "short-term exposure" and "single dose," are also used.) (IPCS 2004)

RELATED TERMS: *contrast with* chronic exposure

acute exposure limits

A variety of short-term exposure limits to hazardous substances, designed to be protective of human health. Published by different organizations, each limit has a different purpose and definition. (EPA 2004)

acute toxicity

1) Any poisonous effect produced within a short period of time following an exposure,

usually 24 to 96 hours. (EPA 2003)
2) The ability of a substance to cause severe biological harm or death soon after a single exposure or dose. Also, any poisonous effect resulting from a single short-term exposure to a toxic substance. (EPA 2005b)
3) Adverse effects that result from a single dose or single exposure of a chemical; any poisonous effect produced within a short period of time, usually less than 96 hours. This term normally is used to describe effects in experimental animals. (EPA 2005e)
4) Adverse effects occurring within a short time (usually up to 14 days) after administration of a single dose of test substance, or after multiple doses administered within 24 hours. (ILSI 2001)

RELATED TERMS: *contrast with* chronic toxicity

adjusted exposure concentration
An estimate of exposure concentration that has been refined, usually by application of an exposure model, to better understand how people in a particular location interact with contaminated media. (EPA 2004)
RELATED TERMS: refined exposure concentration

administered dose
1) The amount of a substance received by a test subject (human or animal) in determining dose-response relationships, especially through ingestion or inhalation. (EPA 2004)
2) In exposure assessment, the amount of a substance given to a test subject (human or animal) to determine dose-response relationships. Since exposure to chemicals is usually inadvertent, this quantity is often called potential dose. (EPA 2005b)

The method of administration (e.g., dermal, injection, inhalation, ingestion) is also an important aspect of administered dose.

adsorption
Removal of a pollutant from air or water by collecting the pollutant on the surface of a solid material; e.g., an advanced method of treating waste in which activated carbon removes organic matter from waste-water (EPA 2005b)
Note that adsorption is different from absorption. Adsorption often means the physical attachement or adhesion of one substance to the surface of another substance.Microbial adsorption to particulate materials in water may be observed and thiscan affect the fate and transport of the microbial entities.

aerosol
1) A suspension of liquid or solid particles in air. (EPA 2003)
2) Small droplets or particles suspended in the atmosphere, typically containing sulfur. They are usually emitted naturally (e.g. in volcanic eruptions) and as the result of anthropogenic (human) activities such as burning fossil fuels. (EPA 2005b)
3) A fine mist or spray that contains minute particles and may contain microorganisms. (Queensland Health 2005)
4) System in which the dispersion medium is a gas and the dispersed phase (composed of solid particles or liquid droplet) does not settle out under the influence of gravity. (SRA

2004)
RELATED TERMS: bioaerosol

aggregate exposure
1) The sum of exposures to pesticide chemical residues with a common mechanism of toxicity from multiple sources and multiple routes of exposure. (EPA 1997a)
2) The combined exposure of an individual (or defined population) to a specific agent or stressor via relevant routes, pathways, and sources. (EPA 2004)
3) The sum total of all exposure to pesticides through inhalation, or dermal, oral, or optic contact. (EPA 2005e)

ambient level
The level (of pollutant) in the general environment as characterized by an average over a suitably long time and large volume. (RAIS 2004, SRA 2004)

ambient measurement
A measurement of the concentration of a substance or pollutant within the immediate environs of an organism; taken to relate it to the amount of possible exposure. (EPA 2005b)

applied dose
The amount of a substance in contact with an absorption boundary of an organism (e.g., skin, lung, gastrointestinal tract) and is available for absorption. (EPA 2004)
RELATED TERMS: dose

average daily dose
ACRONYM: ADD
1) Dose that is averaged over a specified time period taking into account the frequency, duration, and intensity of exposure during that time period. ADDs are usually expressed in units of mg/kg/day. (EPA 1998a)
2) Dose rate averaged over a pathway-specific period of exposure expressed as a daily dose on a per-unit-body-weight basis. The ADD is usually expressed in terms of mg/kg-day or other mass-time units. (EPA 2003)

averaging time
The time period over which something is averaged (e.g., exposure, measured concentration). (EPA 2004)

bioaccumulation
1) The net accumulation of a substance by an organism as a result of uptake from and or all routes of exposure (e.g., ingestion of food, intake of drinking water, direct contact, or inhalation). (EPA 2004)
2) A process where chemicals are retained in fatty body tissue and increase in concentration over time. (EPA 2005e)
3) The process whereby certain toxic substances collect in living tissues, thus posing a substantial hazard to human health or the environment. (RAIS 2004, SRA 2004)

RELATED TERMS: bioconcentration, biomagnification

bioaccumulation factor
ACRONYM: BAF
The concentration of a substance in tissue of an organism divided by its concentration in an environmental medium in situations where the organism and its food are exposed (i.e., accounting for food chain exposure as well as direct chemical uptake). (EPA 1999a)

bioaerosol
1) Organisms or biological agents that can be dispersed through the air and that have the potential to affect human health (NSWEPA 2004)

RELATED TERMS: aerosol, airborne transmission

bioconcentration
1) The net accumulation of a substance by an organism as a result of uptake directly from an environmental medium (e.g., net accumulation by an aquatic organism as a result of uptake directly from ambient water, through gill membranes or other external body surfaces). (EPA 2004)
2) The tendency of a chemical to accumulate in a living organism to levels in excess of the concentration in its surrounding environment. (AIHA 2000)

bioconcentration factor
ACRONYM: BCF
The concentration of a substance in tissue of an organism divided by the concentration in an environmental medium (e.g., the concentration of a substance in an aquatic organism divided by the concentration in the ambient water, in situations where the organism is exposed through the water only). (EPA 2004)

biologically effective dose
The amount of chemical that reaches the cells or target site where an adverse effect may occur. (EPA 2004)

biomagnification (biological magnification)
1) The process whereby certain substances, such as pesticides or heavy metals, transfer up the food chain and increase in concentration. For example, a biomagnifying chemical deposited in rivers or lakes absorbs to algae, which are ingested by aquatic organisms, such as small fish, which are in turn eaten by larger fish, eating birds, terrestrial wildlife, or humans. The chemical tends to accumulate to higher concentration levels with each successive food chain level. (EPA 2004)
2) Biomagnification is the increase of tissue accumulation in species higher in the natural food chain as contaminated food species are eaten. (EPA 2005e)
3) The concentration of certain substances up a food chain. A very important mechanism in concentrating pesticides and heavy metals in organisms such as fish. (RAIS 2004, SRA 2004)

chronic exposure

1) Repeated exposure by the oral, dermal, or inhalation route for more than approximately 10% of the life span in humans (more than approximately 90 days to 2 years in typically used laboratory animal species). (EPA 2003)
2) Continuous exposure, or multiple exposures, occurring over an extended period of time or a significant fraction of the animal's or the individual's lifetime. (EPA 2004)
3) Multiple exposures occurring over an extended period of time or over a significant fraction of an animal's or human's lifetime (usually seven years to a lifetime). (EPA 2005b)
4) Contact with a substance that occurs over a long time (more than one year). (ATSDR 2004)
5) Multiple exposures occurring over an extended period of time, or a significant fraction of the animal's or the individual's lifetime. (RAIS 2004)
6) A continuous or intermittent long-term contact between an agent and a target. (Other terms, such as "long-term exposure," are also used.) (IPCS 2004)

RELATED TERMS: *contrast with* acute exposure

cocktail effect

A term commonly used to describe the possible effect on people of being exposed to a mixture of chemical residues, for example of different pesticides. (FSA 2005)

consumption rate

The average quantity of an item consumed or expended during a given time interval, expressed in quantities by the most appropriate unit of measurement per applicable stated basis. (EPA 2004)

contact

1) Exposure to a source of an infection, or a person so exposed. (CDC 2005)
2) A person or animal that has been in such association with an infected person or animal or a contaminated environment as to have had opportunity to acquire the infection. (MERREA 2005)
3) The touching or apposition of two bodies. A person who has been exposed to a contagious disease. (Stedman 2005)

RELATED TERMS: direct contact, indirect contact, primary contact

contact volume

A volume containing the mass of agent that contacts the exposure surface. (IPCS 2004)

cumulative exposure

The sum of exposures of an organism to a pollutant over a period of time. (EPA 2005b)

direct contact

A mode of transmission of infection between an infected host and susceptible host. Direct contact occurs when skin or mucous surfaces touch, as in shaking hands, kissing, and sexual intercourse. (MERREA 2005)

RELATED TERMS: contact, primary contact; *contrast with* indirect contact

estimated exposure dose
ACRONYM: EED
The measured or calculated dose to which humans are likely to be exposed considering all sources and routes of exposure. (EPA 2003)

exposed
1) A group whose members have been exposed to a supposed cause of disease or health state of interest, or possess a characteristic that is a determinant of the health outcome of interest. (CDC 2005)
2) In epidemiology, the exposed group (or simply, the exposed) is often used to connote a group whose members have been exposed to a supposed cause of a disease or health state of interest, or possess a characteristic that is a determinant of the health outcome of interest. (Last 1983)
3) In epidemiology, the exposed group (or simply, the exposed) is often used to connote a group whose members have been exposed to a supposed cause of a disease or health state of interest or posses a characteristic that is a determinant of the health outcome of interest. (MERREA 2005)

exposure
1) The contact or co-occurrence of a stressor with a receptor. (EPA 1998a)
2) Contact made between a chemical, physical, or biological agent and the outer boundary of an organism. Exposure is quantified as the amount of an agent available at the exchange boundaries of the organism (e.g., skin, lungs, gut). (EPA 2003)
3) Contact made between a chemical, physical, or biological agent and the outer boundary of an organism. (EPA 2004)
4) The amount of radiation or pollutant present in a given environment that represents a potential health threat to living organisms. (EPA 2005b)
5) Radiation or pollutants that come into contact with the body and present a potential health threat. The most common routes of exposure are through the skin, mouth, or by inhalation. (EPA 2005e)
6) Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term (acute exposure), of intermediate duration, or long-term (chronic exposure). (ATSDR 2004)
7) Contact of a chemical, physical or biological agent with the outer boundary of an organism, for example inhalation, ingestion, or contact with the skin. (CRCWQT 2002)
8) The level of a substance, for example a chemical, that a person or animal may be subjected to intentionally or non-intentionally. People can be exposed to substances through food, water and their environment. (FSA 2005)
9) Concentration or amount of a particular agent that reaches a target organism, system or (sub) population in a specific frequency for a defined duration. (IPCS/OECD 2004)
10) Concentration or amount of an infectious micro-organism that reaches the target population, or organism usually expressed in numerical terms of substance, concentration, duration, and frequency. (KIWA 2004)

11) Contact with a substance by swallowing, breathing, direct contact (such as through the skin, eyes or mucous membranes) or intravenous injection. Exposure may be either short term (acute) or long term (chronic). (NYS 1998)
12) Any characteristic or event that might cause or prevent disease. (NZ 2002)
13) The time integral of the concentration of a toxicant that is in the immediate vicinity of various ports of entry (such as lung, GI tract, and skin). (RAIS 2004, SRA 2004)
14) Contact between an agent and a target. Contact takes place at an exposure surface over an exposure period. (IPCS 2004)

Definition #10 considers exposure in both harmful and beneficial contexts, whereas all the other definitions either state or imply that exposure refers to harmful agents only. Definition #7 specifically includes duration of the contact. Although not specifically stated in most of the other definitions, the importance of duration can be implied. In several of the definitions the concentration or dose of the hazard is included.

exposure analysis
The process of characterizing the source and temporal nature of human exposure to a pathogenic microorganism. (ILSI 2000)
RELATED TERMS: exposure assessment

exposure assessment
1) The determination or estimation (qualitative or quantitative) of the magnitude, frequency, or duration, and route or exposure. (EPA 1997a)
2) An identification and evaluation of a population exposed to a toxic agent, describing its composition and size, as well as the type, magnitude, frequency, route, and duration of exposure. (EPA 2003, 2004)
3) Identifying the pathways by which toxicants may reach individuals, estimating how much of a chemical an individual is likely to be exposed to, and estimating the number likely to be exposed. (EPA 2005b)
4) The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with. (ATSDR 2004)
5) The qualitative and/or quantitative evaluation of the likely intake of biological, chemical, and physical agents via food as well as exposures from other sources if relevant. (CAC 1999, CAC 2003, FAO/WHO 2003b)
6) A component of a risk assessment that characterizes the source and magnitude of human exposure to the hazard. (FDA 2002)
7) The process of determining or estimating the magnitude, frequency or duration of exposure to a substance such as a chemical. This may involve taking measurements from many sources to produce an aggregate (combined) assessment. (FSA 2005)
8) Evaluation of the exposure of an organism, system or (sub) population to an agent (and its derivatives). Exposure Assessment is the third step in the process of Risk Assessment. (IPCS/OECD 2004)
9) Qualitative and/or quantitative evaluation of the likely intake of microbial hazard via all relevant sources or a specific source. (KIWA 2004)
10) The process of measuring or estimating the intensity, frequency, and duration of human

exposures to an agent currently present in the environment or of estimating hypothetical exposures that might arise from the release of new chemicals into the environment. (MERREA 2005, RAIS 2004, SRA 2004)

11) The process of measuring or estimating the intensity, frequency, and duration of human exposures to an agent currently present in the environment or of estimating hypothetical exposure that might arise from the release of new chemicals into the environment. In its most complete form, it describes the magnitude, duration, schedule, and route of exposures; the size, nature, and classes of the human populations exposed; and the uncertainties in all estimates. Exposure assessment is often used to identify feasible prospective control options and to predict the effects of available control technologies on exposure. (NRC 1983)
12) A process that estimates the amount of a chemical that enters or comes into contact with people. An exposure assessment also describes the length of time and the nature and size of a population exposed to a chemical. (NYDOH 1999)
13) Exposure assessment is the determination of the amount, duration, and frequency of an actual or hypothetical exposure of people, organisms, or the environment to a substance or an activity that can affect health, the environment, or the ecosystem. Exposure assessments specify the population that might be exposed, identifies the routes through which exposure can occur, and estimates the magnitude, duration, and timing of the doses that people might receive as a result of their exposure. (NYS 1998)
14) The process of estimating or measuring the magnitude, frequency, and duration of exposure to an agent, along with the number and characteristics of the population exposed. Ideally, it describes the sources, pathways, routes, and the uncertainties in the assessment. (IPCS 2004)

RELATED TERMS: exposure analysis

exposure concentration

1) The concentration of a chemical in its transport or carrier medium (i.e., an environmental medium or contaminated food) at the point of contact. (EPA 1997a, EPA 2004)
2) The concentration of a chemical or other pollutant representing a health threat in a given environment. (EPA 2005b)
3) The exposure mass divided by the contact volume or the exposure mass divided by the mass of contact volume, depending on the medium. (IPCS 2004)

exposure duration

1) The total time an individual is exposed to the chemical being evaluated or the length of time over which contact with the contaminant lasts. (EPA 2004)
2) Toxicologically, there are three categories describing duration of exposure: acute (one-time), subchronic (repeated, for a fraction of a lifetime), and chronic (repeated, for nearly a lifetime). (REAP 1995)
3) The length of time over which continuous or intermittent contacts occur between an agent and a target. For example, if an individual is in contact with an agent for 10 min per day for 300 days over a 1-year time period, the exposure duration is 1 year. (IPCS 2004)

exposure event
The occurrence of continuous contact between an agent and a target. (IPCS 2004)

exposure factor
Any of a variety of factors that relate to how an organism interacts with or is otherwise exposed to environmental pollutants (e.g., ingestion rate of contaminated fish). Such factors are used in the calculation of exposure to toxic chemicals. (EPA 2004)

exposure investigation
In public health assessment, the collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances. (EPA 2004)

exposure loading
The exposure mass divided by the exposure surface area. For example, a dermal exposure measurement based on a skin wipe sample, expressed as a mass of residue per skin surface area, is an exposure loading. (IPCS 2004)

exposure mass
The amount of agent present in the contact volume. For example, the total mass of residue collected with a skin wipe sample over the entire exposure surface is an exposure mass. (IPCS 2004)

exposure model
1) A conceptual or mathematical representation of the exposure process. (IPCS 2004)

exposure modeling
The mathematical equations simulating how people interact with chemicals in their environment. (EPA 2004)

exposure pathway
1) The course a chemical or physical agent takes from a source to an exposed organism. An exposure pathway includes a source and release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, a transport/exposure medium (e.g., air) or media (in cases of intermedia transfer) also is included. (EPA 2004)
2) The path from sources of pollutants via soil, water, or food to man and other species or settings. (EPA 2005b)
3) pathway of exposure - The physical course a pesticide takes from the source to the organism exposed (e.g., through food or drinking water consumption or residential pesticide uses). (EPA 2005e)
4) The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating,

drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway. (ATSDR 2004)

5) The process by which an individual is exposed to contaminants or disease organisms that originate from a specified source. An exposure pathway consists of the following five elements: source of contamination, environmental media and transport mechanisms, point of exposure, route of exposure, and receptor population. (NYS 1998)
6) The course an agent takes from the source to the target. (IPCS 2004)

exposure period
The time of continuous contact between an agent and a target. (IPCS 2004)

exposure point
1) An exact location of potential contact between a person and a chemical within an exposure medium. (EPA 1999b)
2) Location of potential contact between an organism and a chemical or physical agent. (AIHA 2000)

exposure profile
1) A summary of the magnitude and spatial and temporal patterns of exposure for the scenarios described in the conceptual model. (EPA 1998a)
2) The exposure profile (ecological) identifies the receptors and describes the exposure pathways and intensity and spatial and temporal extent of exposure. It also describes the impact of variability and uncertainty on exposure estimates and reaches a conclusion about the likelihood that exposure will occur. The profile may be a written document or a module of a larger process model. (EPA 2004)
3) A qualitative and/or quantitative evaluation of the magnitude, frequency, and pattern of exposure to a pathogen, developed during the analysis phase of microbial risk assessment, including a description of the assumptions and uncertainties inherent in such an evaluation. (ILSI 2000)

exposure-response
Exposure-response has been used by EPA when referring to hazards that are not necessarily pathogens. For example, exposure to indicator bacteria may be correlated with a response (gastrointestinal illness), but the indicator is not the cause of the response. Refering to a "dose of indicators" is misleading because it implies the indicator is the causative agent of the health endpoint.
SEE: dose-response

exposure-response relationship
The relationship between exposure level and the incidence of adverse effects. (EPA 2005b)

exposure route
1) The way a chemical enters an organism after contact (e.g., by ingestion, inhalation,

dermal absorption). (EPA 1997a, EPA 2004, EPA 2005b)
2) The way in which an agent enters a target after contact (e.g., by ingestion, inhalation, or dermal absorption). (IPCS 2004)

RELATED TERMS: route of exposure

exposure scenario

1) A set of conditions or assumptions about sources, exposure pathways, concentrations of toxic chemicals, and populations (numbers, characteristics and habits) which aid the investigator in evaluating and quantifying exposure in a given situation. (EPA 2004)
2) A set of conditions or assumptions about sources, exposure pathways, amount or concentrations of agent(s)involved, and exposed organism, system or (sub) population (i.e., numbers, characteristics, habits) used to aid in the evaluation and quantification of exposure(s) in a given situation. (IPCS/OECD 2004)
3) A set of assumptions concerning how an exposure may take place, including exposure setting, stressor characteristics, and activities that may lead to exposure. (EPA 1998a)
4) A combination of facts, assumptions, and inferences that define a discrete situation where potential exposures may occur. These may include the source, the exposed population, the time frame of exposure, microenvironment(s), and activities. Scenarios are often created to aid exposure assessors in estimating exposure. (IPCS 2004)

exposure surface

A surface on a target where an agent is present. Examples of outer exposure surfaces include the exterior of an eyeball, the skin surface, and a conceptual surface over the nose and open mouth. Examples of inner exposure surfaces include the gastrointestinal tract, the respiratory tract, and the urinary tract lining. As an exposure surface gets smaller, the limit is an exposure point. (IPCS 2004)

exposure unit

In geographical information system applications, the geographical area in which a receptor moves and contacts the contaminated medium during the period of exposure. (EPA 2004)

high-end exposure estimate

A plausible estimate of individual exposure or dose for those persons at the upper end of an exposure or dose distribution, conceptually above the 90^{th} percentile, but not higher than the individual in the population who has the highest exposure or dose. (EPA 2004)

incidental ingestion

Unintentional intake of small amounts of agents, particularly associated with children's from hand-to-mouth activity. (REAP 1995)

indirect contact
A mode of transmission of infection involving fomites or vectors. Vectors may be mechanical (e.g., filth, flies) or biological (the disease agent undergoes part of its life cycle in the vector species). (MERREA 2005)
RELATED TERMS: contact; *contrast with* direct contact

indirect exposure
Often defined as an exposure involving multimedia transport of agents from source to exposed individual. Examples include exposures to chemicals deposited onto soils from the air, chemicals released into the ground water beneath a hazardous waste site, or consumption of fruits or vegetables with pesticide residues. (REAP 1995)

ingestion
1) Swallowing (such as eating or drinking). (EPA 2004)
2) The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way. (ATSDR 2004)

RELATED TERMS: route of exposure

ingestion exposure
Exposure to a chemical by swallowing it (such as eating or drinking). (EPA 2004)
RELATED TERMS: route of exposure

inhalation
1) Breathing. (EPA 2004)
2) The act of breathing. A hazardous substance can enter the body this way. (ATSDR 2004)

RELATED TERMS: route of exposure

inhalation exposure
Exposure to a chemical by breathing it in. (EPA 2004)
RELATED TERMS: route of exposure

inhalation unit risk
ACRONYM: IUR
The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/m3 in air. The interpretation of unit risk would be as follows: if unit risk = 2 × 10-6 µg/m^3, 2 excess tumors may develop per 1,000,000 people if exposed daily for a lifetime to a concentration of 1 µg of the chemical in 1 m^3 of air. (EPA 2004)

intake
1) The process by which a substance crosses the outer boundary of an organism without passing an absorption barrier, e.g., through ingestion or inhalation. (EPA 2004)
2) The process by which an agent crosses an outer exposure surface of a target without passing an absorption barrier, i.e., through ingestion or inhalation (see *Dose*). (IPCS 2004)

intake rate
Rate of inhalation, ingestion, and dermal contact depending on the route of exposure. For ingestion, the intake rate is simply the amount of food containing the contaminant of interest that an individual ingests during some specific time period (units of mass/time). For inhalation, the intake rate is the rate at which contaminated air is inhaled. Factors that affect dermal exposure are the amount of material that comes into contact with the skin, and the rate at which the contaminant is absorbed. (EPA 2005b)

integrated exposure assessment
Cumulative summation (over time) of the magnitude of exposure to a toxic chemical in all media. (EPA 2005b)

lifetime exposure
Total amount of exposure to a substance that a human would receive in a lifetime (usually assumed to be 70 years). (EPA 2005b, RAIS 2004)

longer-term exposure
Repeated exposure by the oral, dermal, or inhalation route for more than 30 days, up to approximately 10% of the life span in humans (more than 30 days up to approximately 90 days in typically used laboratory animal species). (EPA 2003

margin of exposure
ACRONYM: MOE

1) The LED_{10} or other point of departure divided by the actual or projected environmental exposure of interest. (EPA 2003)
2) The point of departure divided by the actual or projected environmental exposure of interest. (EPA 2004)
3) The ratio of the no-observed adverse-effect-level to the estimated exposure dose. (EPA 2005b)
4) Ratio of the no-observed-adverse-effect level (NOAEL) for the critical effect to the theoretical, predicted or estimated exposure dose or concentration. (IPCS/OECD 2004)

RELATED TERMS: margin of safety

maximum exposed individual
ACRONYM: MEI

1) The MEI represents the highest estimated risk to an exposed individual, regardless of whether people are expected to occupy that area. (EPA 2004)
2) Maximally (or most) exposed individual: The person with the highest exposure in a given population. (EPA 2005b)

measure of exposure

1) Describes stressor existence and behavior in the environment and its contact or co-occurrence with the assessment endpoint. (EPA 1998a)
2) The quantitative outcome of the exposure assessment. For air toxics risk assessments, personal air concentration (or adjusted exposure concentration) is the metric of exposure

for the inhalation route of exposure and intake rate is the metric of exposure for the ingestion route of exposure**.** (EPA 2004)

3) A measurable characteristic of a stressor (such as the specific amount of mercury in a body of water) used to help quantify the exposure of an ecological entity or individual organism. (EPA 2005b)

RELATED TERMS: metric of exposure

medium intake rate
The rate at which the medium crosses the outer exposure surface of a target during ingestion or inhalation. (IPCS 2004)

metric of exposure
The quantitative outcome of the exposure assessment. For air toxics risk assessments, personal air concentration (or adjusted exposure concentration) is the metric of exposure for the inhalation route of exposure and intake rate is the metric of exposure for the ingestion route of exposure. (EPA 2004)
RELATED TERMS: measure of exposure

microenvironment
Surroundings that can be treated as homogeneous or well characterized in the concentrations of an agent (e.g., home, office, automobile, kitchen, store). This term is generally used for estimating inhalation exposures. (IPCS 2004)

multipathway exposure
When an organism is exposed to pollutants through more than one exposure pathway. One example would be exposure through both inhalation and ingestion. Another example would be ingestion of contaminated soil and ingestion of contaminated food. (EPA 2004)
RELATED TERMS: multipathway assessment, multipathway risk

multiple exposure
SEE: multipathway exposure

pathway specific risk
The risk associated with exposure to a chemical agent or a mixture of chemicals via a specific pathway (e.g., inhalation of outdoor air). (EPA 2004)

per capita intake rate
The average quantity of food consumed per person in a population composed of both individuals who ate the food during a specified time period and those that did not. (EPA 2005b)

pica
1) Deliberate ingestion of non-nutritive substances such as soil. (EPA 1997b)
2) A behaviour characterized by deliberate ingestion of non-nutritive substances, such as soil. (IPCS 2001)

3) A behaviour characterized by deliberate ingestion of non-nutritive substances, such as soil. (IPCS 2004)

point-of-contact measurement of exposure

1) An approach to quantifying exposure by taking measurements of concentration over time at or near the point of contact between the chemical and an organism while the exposure is taking place. (EPA 1992)
2) Estimating exposure by measuring concentrations over time (while the exposure is taking place) at or near the place where it is occurring. (EPA 2005b)

point of exposure

The place where someone can come into contact with a substance present in the environment. (ATSDR 2004)
RELATED TERMS: exposure pathway

population dose

The summation of individual radiation doses received by all those exposed to the source or event being considered. (RAIS 2004, SRA 2004)
RELATED TERMS: population exposure

population exposure

SEE: population dose

reasonable worst case

1) A semiquantitative term referring to the lower portion of the high end of the exposure, dose, or risk distribution. The reasonable worst case has historically been loosely defined, including synonymously with maximum exposure or worst case, and assessors are cautioned to look for contextual definitions when encountering this term in the literature. As a semiquantitative term, it is sometimes useful to refer to individual exposures, doses, or risks that, while in the high end of the distribution, are not in the extreme tail. For consistency, it should refer to a range that can conceptually be described as above the 90th percentile in the distribution, but below about the 98th percentile. (compare maximum exposure range, worst case). (EPA 1992)
2) An estimate of the individual dose, exposure, or risk level received by an individual in a defined population that is greater than the 90th percentile but less than that received by anyone in the 98th percentile in the same population. Reasonably Available Control Technology (RACT): Control technology that is reasonably available, and both technologically and economically feasible. Usually applied to existing sources in nonattainment areas; in most cases is less stringent than new source performance standards. Reasonably Available Control Measures (RACM): A broadly defined term referring to technological and other measures for pollution control. (EPA 2005b)
3) A semiquantitative term referring to the lower portion of the high end of the exposure, dose, or risk distribution. The reasonable worst case has historically been loosely defined, including synonymously with maximum exposure or worst case. As a semiquantitative term, it is sometimes useful to refer to individual exposures, doses, or

risks that, while in the high end of the distribution, are not in the extreme tail. For consistency, it should refer to a range that can conceptually be described as above the 90th percentile in the distribution, but below about the 98th percentile. (EPA 2005d)

RELATED TERMS: worst case

refined exposure concentration

An estimate of exposure concentration that has been refined, usually by application of an exposure model, to better understand how people in a particular location interact with contaminated media. (EPA 2004)

RELATED TERMS: adjusted exposure concentration

route

The way a chemical or pollutant enters an organism including tap water, milk, soft drinks, alcoholic beverages, after contact, e.g., by ingestion, inhalation, or dermal and water intrinsic to purchased foods. (EPA 1997a)

route of exposure

1) Route: The way a chemical or pollutant enters an organism after contact, e.g., by ingestion, inhalation, or dermal absorption. (EPA 1997a)
2) The way people come into contact with a hazardous substance. Three routes of exposure are breathing (inhalation), eating or drinking (ingestion), or contact with the skin (dermal contact). (ATSDR 2004)
3) The pathway (e.g., ingestion, inhalation, dermal) or vehicle by which a pathogen comes into contact with a host organism (e.g., food, soil, fomites, water). (ILSI 2000)

RELATED TERMS: exposure route

short-term exposure

Repeated exposure by the oral, dermal, or inhalation route for more than 24 hours, up to 30 days. (EPA 2003)

subchronic exposure

1) Exposure to a substance spanning approximately 10% of the lifetime of an organism. (EPA 2003)
2) Of intermediate duration, usually used to describe studies or levels of exposure between 5 and 90 days. (EPA 2005b, RAIS 2004)
3) A contact between an agent and a target of intermediate duration between acute and chronic. (Other terms, such as "less-than-lifetime exposure," are also used.) (IPCS 2004)

RELATED TERMS: *contrast with* acute exposure, chronic exposure

vector

1) An animate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host. (CDC 2005)

2) An insect or any living carrier that transports an infectious agent from an infected individual or its wastes to a susceptible individual or its food or immediate surroundings. (MERREA 2004)

The above definitions refer to biological disease vectors. Mechanical disease vector is sometimes used to describe inanimate objects that facilitate disease transmission. In the molecular biology context a vector is a laboratory manipulated biomolecule that is used to facilitate delivery of an associated biomolecule to a tissue or organ within an organism. The most common usage of vector in genetic engineering refers to genetic material (e.g. DNA plasmid) that is ligated (chemically fused) to a gene of interest to allow transfer of that gene to a different organism.

vehicle

An inanimate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host. (CDC 2005)

worst case

1) A semiquantitative term referring to the maximum possible exposure, dose, or risk, that can conceivably occur, whether or not this exposure, dose, or risk actually occurs in a specific population. (EPA 2005d)
2) The situation or input that forces an algorithm or data structure most time or resources. (NIST 2005)
3) A method of conducting an exposure assessment in which the most conservative value of each input parameter is selected. (AIHA 2000)

RELATED TERMS: reasonable worst case, maximum individual risk

5.6 HOST CHARACTERIZATION AND HEALTH EFFECT TERMS

acquired immunity
A form of cellular defense which identifies certain foreign substances (antigens) as harmful to the body. For this reason, the body can acquire resistance to a particular foreign agent. (CancerWEB 2005)
RELATED TERMS: immunity

active immunity
1) An organisms resistance to disease or infection, developed because the organisms immune system has produced antibodies after an infection or inoculation. (CancerWEB 2005)
2) Resistance developed in response to stimulus by an antigen (infecting agent or vaccine) and usually characterized by the presence of antibody produced by the host. (MERREA 2005)

RELATED TERMS: immunity

acute
1) Occurring over a short time (compare with chronic). (ATSDR 2004)
2) Referring to a health effect, sudden onset, often brief; sometimes loosely used to mean severe; referring to exposure, brief, intense, or short-term; sometimes specifically referring to a brief exposure of high intensity. (MERREA 2005)

RELATED TERMS: *contrast with* chronic

acute effect
1) Any toxic effect produced with a short period of time following an exposure, for example, minutes to a few days (EPA 2004)
2) An adverse effect on any living organism in which severe symptoms develop rapidly and often subside after the exposure stops. (EPA 2005e)
3) Occurring over a short time. (ATSDR 2004)
4) Diseases or responses with short and generally severe course (often due to high pollutant concentrations). (RAIS 2004, SRA 2004)

adverse effect
1) A biochemical change, functional impairment, or pathologic lesion that affects the performance of the whole organism, or reduces an organism's ability to respond to an additional environmental challenge. (EPA 2003)
2) (Adverse ecological effects) Changes considered undesirable because they alter valued structural or functional characteristics of ecosystems or their components. (EPA 1998a)
3) Change in morphology, physiology, growth, development, or life span of an organism that results in impairment of functional capacity or impairment of capacity to compensate for additional stress or increase in susceptibility to the harmful effects of other environmental influences. Decisions on whether or not any effect is adverse require expert judgment. (WHO 1994)
4) Change in morphology, physiology, growth, development or lifespan of an organism that

results in impairment of functional capacity or impairment of capacity to compensate for additional stress or increase in susceptibility to the harmful effects of other environmental influences. (ILSI 2001)

5) Change in the morphology, physiology, growth, development, reproduction or life span of an organism, system, or (sub) population that results in an impairment of functional capacity, an impairment of the capacity to compensate for additional stress, or an increase in susceptibility to other influences. (IPCS/OECD 2004)

RELATED TERMS: adverse health effect

Adverse effect is a general term that can be applied more broadly than the effects explicitly stated above. All adverse health effects can be considered adverse effects, however not all adverse effects are adverse health effects. Based on the definitions for the two terms, the distinction is whether health related symptoms are experienced. For example, biochemical changes, pathological lesions, and changes in morphology may be classified as adverse effects even when they are only precursors to an adverse health effect. Even though the two terms are not identical in meaning it is not unreasonable to classify disease symptoms or teratogenic effects (malformations of an embryo or fetus) as adverse effects as well as adverse health effects.

adverse health effect

1) A health effect from exposure to air contaminants that may range from relatively mild and temporary (e.g., eye or throat irritation, shortness of breath, or headaches) to permanent and serious conditions (e.g., birth defects, cancer or damage to lungs, nerves, liver, heart, or other organs), and which negatively affects an individual's health or well-being, or reduces an individual's ability to respond to an additional environmental challenge. (EPA 2004)
2) A change in body function or cell structure that might lead to disease or health problems. (ATSDR 2004)

RELATED TERMS: adverse effect

antagonistic effect

A biologic response to exposure to multiple substances that is less than would be expected if the known effects of the individual substances were added together. (ATSDR 2004)

RELATED TERMS: additive effect, synergistic effect

antibody

1) An immunoglobulin molecule that has a specific amino acid sequence by virtue of which it interacts only with the antigen that induced its synthesis in cells of the lymphoid series (especially plasma cells) or with antigen closely related to it. Antibodies are classified according to their ode of action as agglutinins, bacteriolysins, haemolysins, opsonins, precipitins, etc. (CancerWeb 2005)
2) An immunoglobulin molecule produced by B lymphoid cells with a specific amino acid sequence evoked in humans or other animals by an antigen (immunogen). These molecules are characterized by reacting specifically with the antigen in some demonstrable way, antibody and antigen each being defined in terms of the other. Antibodies may also exist naturally, without being present as a result of the stimulus provided by the introduction of an antigen; antibodies are found in the blood and body

fluids, although the basic structure of the molecule consists of two light and two heavy chains, antibodies may also be found as dimers, trimers, or pentamers. (Stedman 2005)

antigen

1) Substances which are capable, under appropriate conditions, of inducing a specific immune response and of reacting with the products of that response, that is, with specific antibodies or specifically sensitised T-lymphocytes, or both. Antigens may be soluble substances, such as toxins and foreign proteins, or particulates, such as bacteria and tissue cells; however, only the portion of the protein or polysaccharide molecule known as the antigenic determinant (epitopes) combines with antibody or a specific receptor on a lymphocyte. (CancerWeb 2005)
2) Any substance that, as a result of coming in contact with appropriate cells, induces a state of sensitivity and/or immune responsiveness after a latent period (days to weeks) and that reacts in a demonstrable way with antibodies and/or immune cells of the sensitized subject in vivo or in vitro. Modern usage tends to retain the broad meaning of antigen, employing the terms "antigenic determinant" or "determinant group" for the particular chemical group of a molecule that confers antigenic specificity. (Stedman 2005)

asymptomatic

1) Without obvious signs or symptoms of disease. (CancerWEB 2005)
2) Showing or causing no symptoms (a symptom is any subjective evidence of disease or of a patient's condition, i.e., such evidence as perceived by the patient; a change in a patient's condition indicative of some bodily or mental state). Note that a symptom is different from a sign, which is any objective evidence of a disease, i.e., such evidence that is perceptible to the examining physician, as opposed to the subjective sensations (symptoms) of the patient. (Dorland 1981)

RELATED TERMS: subclinical infection, carrier

at-risk population

Any group who may be more susceptible to more serious symptoms or side effects from an illness than the general population. At-risk groups for foodborne illness include: very young children, pregnant women, the elderly, and people with weakened immune systems. (FDA 2001)
RELATED TERMS: population at risk, sensitive subgroups, special populations, subpopulation, susceptible subgroups

attenuation

1) The process by which a compound is reduced in concentration over time, through absorption, adsorption, degradation, dilution, and/or transformation. Can also be the decrease with distance of sight caused by attenuation of light by particulate pollution. (EPA 2005b)
2) Weakening (dilution) of the concentration, as of an antigen in a vaccine. (MERREA 2005)

bacteremia

1) The presence of viable bacteria circulating in the bloodstream. (CancerWeb 2005,

USDA 2004)
2) The presence of bacteria in the blood stream. (Queensland Health 2005)

biological medium
Any one of the major categories of material within an organism (blood, adipose tissue, breath), through which chemicals can move, be stored, or be biologically, physically, or chemically transformed. (EPA 2004)
In microbiology, biological medium is support matrix for sustaining microbiological activity or growth, (e.g., liquid broth, agar plates).

biomarker
1) A specific biochemical in the body which has a particular molecular feature that makes it useful for measuring the progress of disease or the effects of treatment. (CancerWeb 2005)
2) Indicators of changes or events in human biological systems. Biological markers of exposure refer to cellular, biochemical, or molecular measures that are obtained from biological media such as human tissues, cells, or fluids and are indicative of exposure to environmental contaminants. (NRC 1991)
3) Indicator of changes or events in biological systems. Biological markers of exposure refer to cellular, biochemical, analytical, or molecular measures that are obtained from biological media such as tissues, cells, or fluids and are indicative of exposure to an agent. (IPCS 2004)

chronic
1) Occurring over a long time (compare with acute). (ATSDR 2004)
2) Occurring over a long period of time, either continuously or intermittently; used to describe ongoing effects that develop only after a long exposure, especially when referring to health. (CRCWQT 2002)
3) Referring to a health-related state, lasting a long time; referring to exposure, prolonged or long-term, often with specific reference to low intensity. (MERREA 2005)

RELATED TERMS: *contrast with* acute

chronic effect
1) An effect which occurs as a result of repeated or long term (chronic) exposures. (EPA 2003)
2) An adverse effect on a human or animal in which symptoms recur frequently or develop slowly over a long period of time. (EPA 2005b)
3) An adverse effect on any living organism in which symptoms develop slowly over a long period of time or recur frequently. (EPA 2005e)

RELATED TERMS: *contrast with* acute effect

chronic health effects
1) An effect which occurs as a result of repeated or long term (chronic) exposures. (EPA 2003, EPA 2004)
2) An adverse effect on a human or animal in which symptoms recur frequently or develop

slowly over a long period of time. (EPA 2005b)
3) Having a persistent, recurring or long-term nature. (RAIS 2004, SRA 2004)

developmental toxicity
1) Adverse effects on the developing organism that may result from exposure prior to conception (either parent), during prenatal development, or postnatally until the time of sexual maturation. The major manifestations of developmental toxicity include death of the developing organism, structural abnormality, altered growth, and functional deficiency. (EPA 2003)
2) The potential of an agent to cause abnormal development. Developmental toxicity generally occurs in a dose-related manner, may result from short-term exposure (including single exposure situations) or from longer term low-level exposure, may be produced by various routes of exposure, and the types of effects may vary depending on the timing of exposure because of a number of critical periods of development for various organs and functional systems. The four major manifestations of developmental toxicity are death, structural abnormality, altered growth, and functional deficit. (EPA 2004)

diarrhea
An abnormally frequent discharge of semisolid or fluid fecal matter from the bowel. (Stedman 2005)

disease
1) Any deviation from or interruption of the normal structure or function of any part, organ, or system (or combination thereof) of the body that is manifested by a characteristic set of symptoms and signs and whose etiology, pathology, and prognosis may be known or unknown. (Dorland 1984)
2) Literally, dis-ease, the opposite of ease, when something is wrong with a bodily function. The words disease, illness, and sickness are loosely interchangeable, but are better regarded as not synonymous. Disease is a physiological/psychological dysfunction. Illness is a subjective state of the person who feels aware of not being well. Sickness is a state of social dysfunction. (MERREA 2005)
3) A general term describing a morbid condition which can be defined by objective, physical signs (e.g., hypertension), subjective symptoms or mental phobias, disorder of function (e.g., biochemical abnormality), or disorders of structure (anatomic or pathological change). Existence of disease may be questioned in disorder of structure without associated disorder of function. (SRA 2004)

RELATED TERMS: syndrome

duration of infectiousness
Refers to the period of time during which a host excretes infectious pathogen. In this context it does not refer to environmental stability of the pathogen. (EPA 2005f)

foodborne illness
Infection or intoxication caused by the transfer of microbial or chemical contaminants (substances that spoil or infect) from food or drinking water to a human. In most cases, the

contaminants are bacteria, parasites, or viruses. (FDA 2001)

gastroenteritis
An inflammation of the stomach and intestine resulting in diarrhoea, with vomiting and cramps when irritation is excessive. When caused by an infectious agent, it is often associated with fever. (CRCWQT 2002)

health effect
1) The clinical manifestation of disease associated with a specific pathogen, including symptomatic and asymptomatic infections, clinical illness, mortality, and sequelae. (ILSI 2000)
2) Changes in morphology, physiology growth, development or life span of an organism, which results in impairment of functional capacity or impairment of capacity to compensate for additional stress or increase in susceptibility to the harmful effects or other environmental influences. (KIWA 2004)
3) A deviation in the normal function of the human body. (MERREA 2005, RAIS 2004, SRA 2004)

health endpoint
An observable or measurable biological event used as an index to determine when a deviation in the normal function of the human body occurs. (EPA 2004)

host
1) In genetics, the organism, typically a bacterium, into which a gene from another organism is transplanted. In medicine, an animal infected or parasitized by another organism. (EPA 2005b)
2) A person or other living animal, including birds and arthropods, that affords subsistence or lodgment to an infectious agent under natural conditions. In an epidemiologic context, the host may be a population or a group. (Last 1988)
3) A person or other living organism that can be infected by an infectious agent under natural conditions. (CDC 2005)

illness
A condition marked by pronounced deviation from the normal healthy state. (Dorland 1981)
RELATED TERMS: subclinical infection

immune status
Immune status is a frequently used term, so it is surprising that definitions were not readily available. This may be because there are many ways to characterize the human immune system. immune status refers to an individual's (or population's) degree of immune system functioning. Immune markers can include but are not limited to general indicators, such as T-cell count, and myriad specific markers, such as antibodies that confer acquired immunity. In addition, the general strength and specific abilities of an individual's immune system fluctuates through time. It can refer to either individual or population based measures of immunity characteristics.

immunity
The condition of being immune, the protection against infectious disease conferred either by the immune response generated by immunization or previous infection or by other nonimmunologic factors. (CancerWEB 2005)

immunocompromised
1) A state of reduced immune responsiveness as a result of inherited defects, infection, administration of immunosuppressive drugs, irradiation, malnutrition, or certain disease processes. (ILSI 2000)
2) Individuals with a weakened immune system, making them susceptible to additional infections. (USDA 2004)

Pregnancy and young or old age are also associated with weakened immune systems.

incubation period
1) The time from the moment of inoculation (exposure) to the development of the clinical manifestations of a particular infectious disease. (CancerWEB 2005)
2) time interval between invasion of the body by an infecting organism and the appearance of the first sign or symptom it causes; in a disease vector, the period between entry of the disease organism and the time at which the vector is capable of transmitting the disease to another human host. (Stedman 2005)

RELATED TERMS: latency period

individual susceptibility
The marked variability in the manner in which individuals will respond to a given exposure to a toxic agent. (MERREA 2005, SRA 2004)

infectibility
The host characteristic or state in which the host is capable of being infected. (MERREA 2005)

infection
1) Attachment and growth of pathogenic microorganisms, including bacteria, protozoans, viruses, and parasites, on or within the body of a human or animal. (FDA 2001)
2) Colonisation by a micro-organism. (KIWA 2004)
3) The entry and development or multiplication of an infectious agent in the body of man or animals. Infection is not synonymous with infectious disease; the result may be unapparent or manifest. The presence of living infectious agents on exterior surfaces of the body is called "infestation." The presence of living infectious agents upon articles of apparel or soiled articles is called contamination. (MERREA 2005)
4) An illness or carrier state arising from colonization of foodborne microbial pathogens in the human gastrointestinal tract or other parts of the human body. Human antibodies that resist these pathogens may cause chronic complications. (USDA 2004)

RELATED TERMS: contagious

latency period
1) The time between first exposure to an agent and manifestation or detection of a health

effect of interest. (EPA 2003)
2) A period of subclinical or inapparent pathologic changes following exposure, ending with the onset of symptoms of chronic disease. (CDC 2005)
3) Period of time from exposure to an agent to the onset of a health effect. (MERREA 2005, RAIS 2004, SRA 2004)

latent infection
An asymptomatic infection capable of manifesting symptoms under particular circumstances or if activated. (CancerWeb 2005, Stedman 2005)

nosocomial infection
1) Pertaining to or originating in the hospital, said of an infection not present or incubating prior to admittance to the hospital, but generally occurring 72 hours after admittance, the term is usually used to refer to patient disease, but hospital personnel may also acquire nosocomial infection. (CancerWEB 2005)
2) An infection originating in a medical facility, e.g., occurring in a patient in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. Includes infections acquired in the hospital but appearing after discharge; it also includes such infections among staff. (MERREA 2005)

RELATED TERMS: infection

nutritional status
State of the body in relation to the consumption and utilization of nutrients. (CancerWEB 2005)

outcome
A term used in risk assessment that refers to an effect or consequence such as disease, illness, injury, birth defect, organ damage, death, etc. (NYS 1998)

patient isolation
The segregation of patients with communicable or other diseases for a specified time. Isolation may be strict, in which movement and social contacts are limited; modified, where an effort to control specified aspects of care is made in order to prevent cross infection; or reverse, where the patient is secluded in a controlled or germ-free environment in order to protect him or her from cross infection. (CancerWeb 2005).

population at risk
1) A population subgroup that is more likely to be exposed to a chemical, or is more sensitive to the chemical, than is the general population. (EPA 2005b)
2) A limited population that may be unique for a specific dose-effect relationship; the uniqueness may be with respect to susceptibility to the effect or with respect to the dose or exposure itself. (MERREA 2005, RAIS 2004, SRA 2004)

RELATED TERMS: at-risk population, sensitive subgroups, special populations, subpopulation**,** susceptible subgroups

protective immunity
State of specific resistance to infection and infectious disease resulting from prior exposure to a pathogen and/or pathogen-derived toxins. (ILSI 2000)
RELATED TERMS: immunity

secondary infection
An infection, usually septic, occurring in a person or animal already suffering from an infection of another nature. (CancerWeb 2005, Stedman 2005)

sensitive subgroups
Identifiable subsets of the general population that, due to differential exposure or susceptibility, are at greater risk than the general population to the toxic effects of a specific air pollutant (e.g., depending on the pollutant and the exposure circumstances, these may be groups such as subsistence fishers, infants, asthmatics, or the elderly). (EPA 2004)
RELATED TERMS: at-risk population, population at risk, special populations, subpopulation, susceptible subgroups

sensitivity
1) The ability of a test to work on people you know have the infection. More precisely TP/(TP+FN), where TP is the number of true positives and FN is the number of false negatives. (Swinton 1999)
2) Sensitivity of a screening test is the proportion of truly diseased persons in the screened population who are identified as diseased by the screening test. Sensitivity is a measure of the probability of correctly diagnosing a case, or the probability that any given case will be identified by the test (Syn: true positive rate). (Last 1983)

RELATED TERMS: specificity

sequelae
Abnormal conditions that arise following the acute phase of a disease. For example, kidney failure may follow acute *E. coli* O157:H7 disease. (USDA 2004)

severity of illness
The degree or extent of clinical disease produced by an infectious microorganism or toxin. Severity of illness does not necessarily reflect severity of infection. (ILSI 2000)

severity of infection
The degree or extent to which a microorganism multiplies or develops in a susceptible host. Severity of infection does not necessarily determine severity of illness. (ILSI 2000)

special populations
People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations. (ATSDR 2004)

RELATED TERMS: at-risk population, population at risk, sensitive subgroups, subpopulation, susceptible subgroups

specific immunity
The immune status in which there is an altered reactivity directed solely against the antigenic determinants (infectious agent or other) that stimulated it. (CancerWEB 2005)
RELATED TERMS: immunity

subclinical infection
1) An infection in which symptoms are sufficiently mild or inapparent to escape diagnosis other than by positive confirmation of the ability to transmit the infection or serologically. (CancerWeb 2005)
2) Infection associated with no detectable clinical signs but caused by a microorganism capable of producing clinical illness. Infection may remain subclinical, or signs and symptoms of disease may subsequently become apparent. (ILSI 2000)

RELATED TERMS: asymptomatic

subpopulation
A subset of the target population that has been identified for a specific purpose, usually requires the ability to estimate an attribute of the subpopulation. (EPA 2005c)
RELATED TERMS: at-risk population, population at risk, sensitive subgroups, special populations, susceptible subgroups

susceptibility
1) Increased likelihood of an adverse effect, often discussed in terms of relationship to a factor that can be used to describe a human subpopulation (e.g., life stage, demographic feature, or genetic characteristic). (EPA 2003, ATSDR 2004)
2) The extent to which a host is vulnerable to infection by a pathogen, taking into account a host's intrinsic and/or acquired traits that modify the risk of infection. (ILSI 2000)

susceptible subgroups
May refer to life stages, for example, children or the elderly, or to other segments of the population, for example, asthmatics or the immune-compromised, but are likely to be somewhat chemical-specific and may not be consistently defined in all cases. (EPA 2003, ATSDR 2004)
RELATED TERMS: at-risk population, population at risk, sensitive subgroups, special populations, subpopulation

syndrome
1) A set of signs or a series of events occurring together that often point to a single disease or condition as the cause. (CancerWeb 2005)
2) A group of symptoms and signs that tend to appear together and collectively characterize a disorder. (MERREA 2005)
3) The aggregate of symptoms and signs associated with any morbid process, and constituting together the picture of the disease. (Stedman 2005)

RELATED TERMS: disease

systemic effects

1) Toxic effects as a result of absorption and distribution of a toxicant to a site distant from its entry point. (EPA 2003)
2) Systemic effects are those that require absorption and distribution of the toxicant to a site distant from its entry point, at which point effects are produced. Most chemicals that produce systemic toxicity do not cause a similar degree of toxicity in all organs, but usually demonstrate major toxicity to one or two organs. These are referred to as the target organs of toxicity for that chemical. Systemic effects do not include cancer. (RAIS 2004)

RELATED TERMS: systemic toxicity

systemic toxicity
SEE: systemic effects

target
Any biological entity that receives an exposure or a dose (e.g., a human, a human population, or a human organ). (IPCS 2004)

target organ
The biological organ(s) most adversely affected by exposure to a chemical, physical, or biological agent. (EPA 2003)

target population
The target population is the entire group a researcher is interested in; the group about which the researcher wishes to draw conclusions. (STEPS 1997)
RELATED TERMS: population

uptake (absorption)
The process by which an agent crosses an absorption barrier (see *Dose*). (IPCS 2004)

5.7 EPIDEMIOLOGY AND SURVEILLANCE TERMS

absolute risk
An incidence rate, usually expressed per 1,000 individuals. (NZ 2002)

aggregate surveillance
The surveillance of a disease or health event by collecting summary data on groups of cases, e.g., general practitioners taking part in surveillance schemes are asked to report the number of cases of specified diseases seen over a specified period of time. (MERREA 2005)
RELATED TERMS: public health surveillance, surveillance

analytic epidemiology
The aspect of epidemiology concerned with the search for health-related causes and effects. Uses comparison groups, which provide baseline data, to quantify the association between exposures and outcomes, and test hypotheses about causal relationships. (CDC 2005)
RELATED TERMS: applied epidemiology

analytical epidemiologic study
An evaluation of the association between exposure to hazardous substances and disease by testing scientific hypotheses. (EPA 2004)

applied epidemiology
1) The application or practice of epidemiology to address public health issues. (CDC 2005)
2) The application and evaluation of epidemiologic discoveries and methods in public health and health care settings. It includes applications of etiologic research, priority setting and evaluation of health programs, policies, and services. It is epidemiologic practice aimed at protecting and /or improving the health of a defined population. It usually involves identifying and investigating health problems, monitoring for changes in health status, and/or evaluating the outcomes of interventions. It is general conducted in a time frame determined by the need to protect the health of an exposed population and an administrative context that results in public health action. (MERREA 2005)

RELATED TERMS: analytic epidemiology

attack rate
1) The proportion of an exposed population at risk who become infected or develop clinical illness during a defined period of time. (FAO/WHO 2003b, ILSI 2000)
2) The proportion of a disease-free population that becomes ill during a stated or implied period of risk. (NZ 2002)

burden of illness
The sum total incidence, severity, and duration of gastrointestinal disease are known as burden of these illnesses. (Payment and Riley 2002)

carrier
1) The inert liquid or solid material in a pesticide product that serves as a delivery vehicle

for the active ingredient. Carriers do not have toxic properties of their own. (EPA 2005b)
2) Any material or system that can facilitate the movement of a pollutant into the body or cells. (EPA 2005b)
3) An individual who does not display the symptoms of a disease, but harbors the pathogen which causes it, or has the gene (or genes) for it, and can transmit the disease to others either through interacting with other individuals, or by passing the disease-causing gene (or genes) to offspring. (CancerWEB 2005)
4) A person or animal without apparent disease who harbors a specific infectious agent and is capable of transmitting the agent to others. The carrier state may occur in an individual with an infection that is inapparent throughout its course (known as asymptomatic carrier), or during the incubation period, convalescence, and postconvalescence of an individual with a clinically recognizable disease. The carrier state may be of short or long duration (transient carrier or chronic carrier). (CDC 2005)
5) A person or animal that harbors a specific infectious agent in the absence of discernible clinical disease and serves as a potential source of infection. (MERREA 2005)

case
1) In epidemiology, a countable instance in the population or study group of a particular disease, health disorder, or condition under investigation. Sometimes, an individual with the particular disease. (CDC 2005)
2) In epidemiology, a person in the population or study group identified as having the particular disease, health disorder, or condition under investigation. (MERREA 2005)
3) An individual who is ill following ingestion of food. Outbreak cases reported by CDC are determined to be contaminated on the basis of laboratory analysis and/or epidemiological evidence. Not all outbreak cases need be confirmed by laboratory analysis if there is sufficient epidemiological evidence linking them to the outbreak. (USDA 2004)

case-control study
1) An epidemiologic study contrasting those with the disease of interest (cases) to those without the disease (controls). The groups are then compared with respect to exposure history, to ascertain whether they differ in the proportion exposed to the chemical(s) under investigation. (EPA 2003)
2) A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease. (ATSDR 2004)
3) A type of observational analytic study. Enrollment into the study is based on presence ("case") or absence ("control") of disease. Characteristics such as previous exposure are then compared between cases and controls. (CDC 2005)
4) A retrospective observational study designed to determine the relationship between a particular outcome of interest (e.g., disease or condition) and a potential cause (e.g., an intervention, risk factor, or exposure). Investigators identify a group of patients with a specified outcome (cases) and a group of patients without the specified outcome (controls). Investigators then compare the histories of the cases and the controls to

determine the rate or level at which each group experienced a potential cause. As such, this study design leads from outcome (disease or condition) to cause (intervention, risk factor, or exposure). (NLM/NICHSR 2004)

5) An inquiry in which groups of individuals are selected in terms of whether they do (the cases) or do not (the controls) have the disease of which the etiology is to be studied, and the groups are then compared with respect to existing or past characteristics judged to be of possible relevance to the etiology of the disease. (RAIS 2004, SRA 2004)

case definition

1) A set of standard criteria for deciding whether a person has a particular disease or health-related condition, by specifying clinical criteria and limitations on time, place, and person. (CDC 2005)
2) The case definition is a standard set of criteria for deciding whether an individual should be classified as having the health condition of interest. (Gregg 1996)
3) A set of diagnostic criteria that must be fulfilled in order to identify a person as a case of a particular disease. Case definition can be based on clinical, laboratory, or combined clinical and laboratory criteria, or a scoring system with points for each criterion that matches the features of the disease. (MERREA 2005)

RELATED TERMS: syndrome

case-fatality ratio

A ratio of the number of deaths due to a disease to the number of cases of that disease in a specified period of time. It expresses the frequency with which affected individuals die of the disease. (SRA 2004)

case study

1) A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures. (EPA 2004, ATSDR 2004)
2) A brief fact sheet providing risk, cost, and performance information on alternative methods and other pollution prevention ideas, compliance initiatives, voluntary efforts, etc. (EPA 2005b)
3) An uncontrolled (prospective or retrospective) observational study involving an intervention and outcome in a single patient. (Also known as a single case report or anecdote.) (NLM/NICHSR 2004)

RELATED TERMS: anecdotal data, anecdotal evidence

case-study epidemiologic study

SEE: case study

case-control epidemiologic study

SEE: case-control study

chronic study

A toxicity study designed to measure the (toxic) effects of chronic exposure to a chemical. (EPA

2003)

clinical illness
Deviation from the normal healthy state, manifested as symptomatic disease. (ILSI 2000)

clinical trial
Research study conducted with patients, usually to evaluate a new treatment or drug. Each trial is designed to answer scientific questions and to find better ways to treat individuals with a specific disease. (CancerWEB 2005)
RELATED TERMS: experimental study

cluster
1) An aggregation of cases of a disease or other health-related condition, particularly cancer and birth defects, which are closely grouped in time and place. The number of cases may or may not exceed the expected number; frequently the expected number is not known. (CDC 2005)
2) An aggregation of relatively uncommon events or diseases in space and/or time in amounts that are believed or perceived to be greater than could be expected by chance. (MERREA 2005)

cluster investigation
A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors. (ATSDR 2004)

cohort
1) A group of people within a population that can be aggregated because the variation in a characteristic of interest (e.g., exposure, age, education level) within the group is much less than the group-to-group variation across the population. (EPA 2004)
2) A well-defined group of people who have had a common experience or exposure, who are then followed up for the incidence of new diseases or events, as in a cohort or prospective study. A group of people born during a particular period or year is called a birth cohort. (CDC 2005)
3) A fixed population in which membership is permanent (in contrast to a dynamic population). Also defined as a group of persons who experience a certain event in a specified period of time (e.g., a birth cohort of babies born in 1990 in New Zealand). (NZ 2002)

cohort epidemiologic study
SEE: cohort study

cohort study
1) An epidemiologic study comparing those with an exposure of interest to those without the exposure. These two cohorts are then followed over time to determine the differences

in the rates of disease between the exposure subjects. (EPA 2003)
2) A type of observational analytic study. Enrollment into the study is based on exposure characteristics or membership in a group. Disease, death, or other health-related outcomes are then ascertained and compared. (CDC 2005)
3) An observational study in which outcomes in a group of patients that received an intervention are compared with outcomes in a similar group, i.e., the cohort, either contemporary or historical, of patients that did not receive the intervention. In an adjusted- (or matched-) cohort study, investigators identify (or make statistical adjustments to provide) a cohort group that has characteristics (e.g., age, gender, disease severity) that are as similar as possible to the group that experienced the intervention. (NLM/NICHSR 2004)
4) A follow-up or longitudinal study that assesses exposure status before assessing outcome. (NZ 2002)
5) An epidemiologic study that observes subjects in differently exposed groups and compares the incidence of symptoms. Although ordinarily prospective in nature, such a study is sometimes carried out retrospectively, using historical data. (RAIS 2004)

RELATED TERMS: prospective study, retrospective study

control
In a case-control study, comparison group of persons without disease. (CDC 2005)
RELATED TERMS: case, case-control study

control group
1) A group used as the baseline for comparison in epidemiologic studies or laboratory studies. This group is selected because it either lacks the disease of interest (case-control group) or lacks the exposure of concern (cohort study). (EPA 2003)
2) The set of observations in an experiment or prospective study that do not receive the experimental treatment(s). These observations serve (a) as a comparison point to evaluate the magnitude and significance of each experimental treatment, (b) as a reality check to compare the current observations with previous observation history, and (c) as a source of data for establishing the natural experimental error. (NIST/SEMATECH 2005b)

RELATED TERMS: reference group

cross-sectional study
An epidemiological study design in which measurements of cause and effect are made at the same point in time. (SRA 2004)

death rate
1) An estimate of the portion of a population that dies during a specified period. (MERREA 2005)
2) An estimate of the proportion of the population that dies during a specified period, usually a year; the numerator is the number of people dying, the denominator is the number in the population, usually an estimate of the number at the midperiod. (Stedman 2005)

RELATED TERMS: mortality

descriptive epidemiologic study
An evaluation of the amount and distribution of a disease in a specified population by person, place, and time. (EPA 2004)

disease surveillance
SEE: public health surveillance, surveillance

endemic
1) Present or usually prevalent in a population or geographical area at all times, said of a disease or agent. (CancerWEB 2005)
2) The constant presence of a disease or infectious agent within a given geographic area or population group; may also refer to the usual prevalence of a given disease within such area or group. (CDC 2005)
3) Something found in a particular people or location, such as a disease that is always present in the population. (CRCWQT 2002)
4) Denoting a temporal pattern of disease occurrence in a population in which the disease occurs with predictable regularity with only relatively minor fluctuations in its frequency over time. (Stedman 2005)

epidemic
1) Occurring suddenly in numbers clearly in excess of normal expectancy, said especially of infectious diseases but applied also to any disease, injury or other health related event occurring in such outbreaks. (CancerWEB 2005)
2) The occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time. (CDC 2005)
3) Widespread outbreak of a disease, or a large number of cases of a disease in a single community or relatively small area. Disease may spread from person to person, and/or by the exposure of many persons to a single source, such as a water supply. (CRCWQT 2002)
4) The occurrence in a community or region of cases of an illness, specific health-related behavior, or other health-related events clearly in excess of normal expectancy; the word also is used to describe outbreaks of disease in animals or plants. (Stedman 2005)

RELATED TERMS: outbreak; *contrast with* endemic, epizootic

epidemiology
1) The study of the distribution and determinants of health-related states or events in specified populations. (EPA 2003)
2) The study of disease patterns in human populations. (EPA 2004)
3) Study of the distribution of disease, or other health-related states and events in human populations, as related to age, sex, occupation, ethnicity, and economic status in order to identify and alleviate health problems and promote better health. (EPA 2005b)
4) The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans. (ATSDR 2004)

5) The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems. (CDC 2005)
6) A branch of medicine which studies the patterns of diseases in populations, and their causes. The objective of epidemiology is to understand how and why diseases occur so that ways can be developed to prevent or reduce disease. (CRCWQT 2002)
7) The study of the occurrence and causes of diseases or other health-related conditions, states, or events in specified populations. One of the chief functions of this study is to identify populations at high risk for a given disease, so that the cause may be known and preventive measures implemented. (FDA 2001)
8) The study of the occurrence of disease, or other health-related variables, in human populations. (NZ 2002)
9) The study of the distribution and dynamics of diseases and injuries in human populations. Specifically, the investigation of the possible causes of a disease and its transmission. (RAIS 2004)

epidemiology triad
The traditional model of infectious disease causation. Includes three components: an external agent, a susceptible host, and an environment that brings the host and agent together, so that disease occurs. (CDC 2005)
Also referred to as the epi-triad.

epizootic
1) Veterinary equivalent of an epidemic. (CancerWeb 2005)
2) Denoting a temporal pattern of disease occurrence in an animal population in which the disease occurs with a frequency clearly in excess of the expected frequency in that population during a given time interval. An outbreak (epidemic) of disease in an animal population. (Stedman 2005)

experimental study
A study in which the investigator specifies the exposure category for each individual (clinical trial) or community (community trial), then follows the individuals or community to detect the effects of the exposure. (CDC 2005)
RELATED TERMS: clinical trial

follow-up study
SEE: cohort study

general population
The total of individuals inhabiting an area or making up a whole group. (EPA 1997a)

health outcome data
In a public health assessment, community-specific health information such as morbidity and mortality data, birth statistics, medical records, tumor and disease registries, surveillance data, and previously conducted health studies that may be collected at the local, state, and national

levels by governments, private health care organizations, and professional institutions and associations. (EPA 2004)

health outcomes study
In a public health assessment, an investigation of exposed persons designed to assist in identifying exposure or effects on public health. Health studies also define the health problems that require further inquiry by means of, for example, a health surveillance or epidemiologic study. (EPA 2004)

herd immunity
1) An estimate of exposure, or dose level received anyone in a defined population that is greater than the 90th percentile of all individuals in that population, but less than the exposure at the highest percentile in that population. A high end risk descriptor is an estimate of the risk level for such individuals. Note that risk is based on a combination of exposure and susceptibility to the stressor. (EPA 2005b)
2) Resistance of a group to a pathogen due to immunity of a large proportion of the group to that pathogen. (NLM 2005)
3) The resistance of a group to invasion and spread of an infectious agent, based on the resistance to infection of a high proportion of individual members of the group. The resistance is a product of the number susceptible and the probability that those who are susceptible will come into contact with an infected person. (CDC 2005)
4) The immunity of a group or community. The resistance of a group to invasion and spread of an infectious agent, based on the resistance to infection of a high proportion of individual members of the group. The resistance is a product of the number susceptible and the probability that those who are susceptible will come into contact with an infected person. (MERREA 2005)

high-risk community
A community located within the vicinity of numerous sites of facilities or other potential sources of environmental exposure/health hazards which may result in high levels of exposure to contaminants or pollutants. (EPA 2005b)

incidence
1) The number of new cases of a disease that develop within a specified population over a specified period of time. (EPA 2003)
2) The number of new cases of disease in a defined population over a specific time period. (ATSDR 2004)
3) The rate of occurrence of new cases of a disease or condition in a population at risk during a given period of time, usually one year. (NLM/NICHSR 2004)
4) The number of new cases of a disease in a population over a period of time. (RAIS 2004, SRA 2004)
5) A measure of the magnitude of a disease, usually expressed as the number of new cases of a disease per 100,000 individuals in the U.S. population in a one-year period. (USDA 2004)

RELATED TERMS: *contrast with* prevalence

incidence rate

1) The ratio of new cases within a population to the total population at risk given a specified period of time. (EPA 2003)
2) A measure of the frequency with which an event, such as a new case of illness, occurs in a population over a period of time. The denominator is the population at risk; the numerator is the number of new cases occurring during a given time period. (CDC 2005)

index case (proband)

1) A person who first draws attention to their family. For example, if my eye doctor discovers I have glaucoma and subsequently other cases of glaucoma are found in my family, I am the index case. Also called the propositus (if male) or proposita (if female). (CancerWeb 2005)
2) In human genetics, the patient or member of the family that brings a family under study. (Stedman 2005)

Note: Index case can also refer to the initial case in a larger population and not just within a family.

instrument error

A type of non-sampling error caused by the survey instrument (or questionnaire) itself, such as unclear wording, asking respondents for information they are unable to supply or the instrument being changed in some way during the course of the research. (ESOMAR 2001)
RELATED TERMS: survey

longitudinal epidemiologic study
SEE: cohort study

matching

1) The process of making a study group and a comparison group in an epidemiological study comparable with respect to extraneous or confounding factors such as age, sex, weight, etc. (CancerWEB 2005)
2) In a retrospective study, a method for identifying a comparison group. Matching pairs observational unit: each unit that has both trait-of-interest A and nuisance effects B,C,... with another unit that lacks trait-of-interest A, yet still shares B,C,... Low yielding lots (trait-of-interest is yield) are in this way compared to well yielding lots of the same product started at about the same time. Matches in this way are more sensitive to key causal differences (for example, in the particular equipment set used) than would occur from taking "matches" from all available lots. Matching is a way of implementing commonality studies. Matching is a kind of blocking for retrospective studies. (NIST/SEMATECH 2005b)

RELATED TERMS: case-control study, retrospective study

morbidity

1) State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life. (ATSDR 2004)

2) Any departure, subjective or objective, from a state of physiological or psychological well-being. (CDC 2005)
3) A departure from a state of physical or mental well-being, resulting from disease or injury. Frequently used only if the affected individual is aware of the condition. Awareness itself connotes a degree of measurable impact. Frequently, but not always, there is a further restriction that some action has been taken such as restriction of activity, loss of work, seeking of medical advice, etc. (MERREA 2004, RAIS 2004, SRA 2004)

morbidity rate
The number of illnesses or cases of disease in a population in relation to the total population. (NYS 1998)
RELATED TERMS: incidence

mortality
1) Death. Usually the cause (a specific disease, a condition, or an injury) is stated. (ATSDR 2004)
2) Death; the death rate; ratio of number of deaths to a given population. (RAIS 2004, SRA 2004)

RELATED TERMS: death rate

mortality rate
1) A measure of the frequency of occurrence of death in a defined population during a specified interval of time. (CDC 2005)
2) The number of deaths that occur in a given population during a given time interval; usually deaths per $l0^3$ or $l0^5$ people per year. Can be age, sex, race, and cause specific. (MERREA 2005, RAIS 2004, SRA 2004)

RELATED TERMS: death rate

notifiable disease
1) Diseases, usually of an infectious nature, whose occurrence is required by law to be made known to a health officer or local government authority. (CancerWEB 2005)
2) A disease that, by statutory requirements, must be reported to the public health authority in the pertinent jurisdiction when the diagnosis is made. A disease deemed of sufficient importance to the public health to require that its occurrence be reported health authorities. The reporting to public health authorities of communicable diseases is, unfortunately, very incomplete. The reasons for this include diagnostic inexactitude, the desire of patients and physicians to conceal the occurrence of conditions carrying a social stigma, and the indifference of physicians to the usefulness of information about such diseases as hepatitis, influenza, and measles. Notifications provide the starting point for investigations into the failure of preventive measures, such immunizations, for tracing sources of infection, for finding common vehicles of infection, for describing the geographic clustering of infection, and for various other purposes, depending upon the particular disease. (MERREA2005)

observational epidemiologic study

A study in which the investigators do not manipulate the use of, or deliver, an intervention (e.g., do not assign patients to treatment and control groups), but only observe patients who are (and sometimes patients who are not as a basis of comparison) exposed to the intervention, and interpret the outcomes. These studies are more subject to selection bias than experimental studies such as randomized controlled trials. (NLM/NICHSR 2004)
RELATED TERMS: observational study

observational study
A study in which the investigators do not manipulate the use of, or deliver, an intervention (e.g., do not assign patients to treatment and control groups), but only observe patients who are (and sometimes patients who are not as a basis of comparison) exposed to the intervention, and interpret the outcomes. These studies are more subject to selection bias than experimental studies such as randomized controlled trials. (NLM/NICHSR 2004)
RELATED TERMS: observational epidemiologic study

occurrence
In epidemiology, a general term describing the frequency of a disease or other attribute or event in a population without distinguishing between incidence and prevalence. (MERREA 2005)
Occurrence is also used in the context of pathogen occurrence, which is a step in exposure analysis in the MRA Protocol.

odds ratio
ACRONYM: OR

1) A relative measure of the difference in exposure between the diseased (cases) and not diseased (controls) individuals in a case-control study. The OR is interpreted similarly to the relative risk. (EPA 2003)
2) A measure of association that quantifies the relationship between an exposure and health outcome from a comparative study; also known as the cross-product ratio. (CDC 2005)
3) A measure of treatment effect that compares the probability of a type of outcome in the treatment group with the outcome of a control group, i.e., [Pt ÷ (1 - Pt)] [Pc ÷ (1 - Pc)]. For instance, if the results of a trial were that the probability of death in a control group was 25% and the probability of death in a treatment group was 10%, the odds ratio of survival would be [0.10 ÷ (1.0 - 0.10)] ÷ [(0.25 ÷ (1.0 - 0.25)] = 0.33. (NLM/NICHSR 2004)

outbreak

1) Synonymous with epidemic. Sometimes the preferred word, as it may escape sensationalism associated with the word epidemic. Alternatively, a localized as opposed to generalized epidemic. (CDC 2005)
2) An epidemic limited to localized increase in the incidence of a disease, e.g., in a village, town, or closed institution. (MERREA 2005)

RELATED TERMS: epidemic

outbreak data
CDC data on foodborne disease outbreaks define an outbreak as an incident in which two or

more persons experienced a similar illness after ingestion of a common food, and epidemiologic analysis implicated a food as the source of the illness. There are two exceptions, botulism and chemical poisoning, in which one case constitutes an outbreak. (USDA 2004)

outbreak, foodborne
An incident in which two or more cases of a similar illness result from eating the same food. (FDA/CFSAN 2001)

pandemic
1) A widespread epidemic throughout an area, nation or the world. (EPA 2005b)
2) An epidemic that affects a wide geographic area. (CancerWeb 2005)
3) An epidemic occurring over a very wide area (several countries or continents) and usually affecting a large proportion of the population. (CDC 2005)
4) An epidemic occurring worldwide, or over a very wide area, crossing international boundaries, and usually affecting a large number of people. (MERREA 2005)
5) Denoting a disease affecting or attacking the population of an extensive region, country, continent, global; extensively epidemic. (Stedman 2005)

RELATED TERMS: epidemic

person-time
A unit of measurement combining persons and time, used as denominator in instantaneous incidence rates. It is the sum of individual units of time that the persons in the study population have been exposed to the condition of interest. A variant is person-distance, e.g., as in passenger-miles. The most frequently used person-time is person-years. With this approach, each subject contributes only as many years of observation to the population at risk as he is actually observed; if he leaves after one year, he contributes one person-year; if after ten, ten person-years. The method can be used to measure incidence over extended and variable tiffs periods. (Last 1983)

person-year
The sum of the number of years each person in the study population is at risk; a metric used to aggregate the total population at risk assuming that 10 people at risk for one year is equivalent to 1 person at risk for 10 years. (RAIS 2004, SRA 2004)

population risk
Population risk refers to an estimate of the extent of harm for the population or population segment being addressed. It often refers to an analysis of the number of people living at a particular risk or hazard level. (EPA 2004)

premature death
A death that occurs before statistical expectation, usually attributable to a specific cause, and usually referring to deaths statistically estimated in a population rather than to individuals. (RAIS 2004, SRA 2004)

prevalence

1) The proportion of disease cases that exist within a population at a specific point in time, relative to the number of individuals within that population at the same point in time. (EPA 2003)
2) The number of existing disease cases in a defined population during a specific time period. (ATSDR 2004)
3) The number or proportion of cases or events or conditions in a given population. (CDC 2005)
4) The number of events, e.g., instances of a given disease or other condition, in a given population at a designated time. (MERREA 2005)
5) The number of people in a population with a specific disease or condition at a given time, usually expressed as a ratio of the number of affected people to the total population. (NLM/NICHSR 2004)
6) The number of existing cases in a population who have the disease at a given point (or during a given period) of time. (RAIS 2004, SRA 2004)
7) The total number of cases of a given disease at a particular point in time, includes new (i.e., incidence) as well as chronic cases. (USDA 2004)

RELATED TERMS: *contrast with* incidence

prevalence rate

The proportion of persons in a population who have a particular disease or attribute at a specified point in time or over a specified period of time. (CDC 2005)

prevalence survey

The measure of the current level of disease (s) or symptoms and exposures through a questionnaire that collects self-reported information from a defined population. (ATSDR 2004)
RELATED TERMS: survey
Prevalence surveys can also include diagnostic testing (often serology) to assess disease/infection status; although most also include a questionnaire as a component. Prevalence surveys in wild animal populations obviously do not include questionnaires.

primary contact

Person(s) in direct contact or associated with a communicable disease case. (MERREA 2005)
RELATED TERMS: contact, direct contact

primary transmission

Direct or indirect transfer of a food- or waterborne pathogen from a contaminated medium to a susceptible host, whether or not disease is produced. (ILSI 2000)

proportionate mortality ratio

ACRONYM: PMR

1) The proportion of deaths due to the disease of interest in the exposed population divided by the proportion of deaths due to the disease of interest in the unexposed or reference population. It is frequently converted to a percent by multiplying the ratio by 100. (EPA 2003)

2) The fraction of all deaths from a given cause in the study population divided by the same fraction from a standard population. A tool for investigating cause-specific risks when only data on deaths are available. If data on the population at risk are also available, standardized mortality ratios are preferred. (RAIS 2004, SRA 2004)

prospective epidemiologic study
SEE: prospective study

prospective study
1) An epidemiologic study comparing those with an exposure of interest to those without the exposure. These two cohorts are then followed over time to determine the differences in the rates of disease between the exposure subjects. (EPA 2003)
2) A study in which the investigators plan and manage the intervention of interest in selected groups of patients. As such, investigators do not know what the outcomes will be when they undertake the study. (NLM/NICHSR 2004)
3) A study in which the disease events to be measured have not occurred when the study begins, and so study participants have no foreknowledge of their possible involvement. Both follow-up studies and case-control studies can be prospective with respect to their accumulation of cases. (NZ 2002)
4) An inquiry in which groups of individuals are selected in terms of whether they are or are not exposed to certain factors, and then followed over time to determine differences in the rate at which disease develops in relation to exposure to the factor. Also called cohort study. (RAIS 2004, SRA 2004)

RELATED TERMS: cohort study; *contrast with* retrospective study

public health surveillance
1) The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs. (ATSDR 2004)
2) The systematic collection, analysis, interpretation, and dissemination of health data on an ongoing basis, to gain knowledge of the pattern of disease occurrence and potential in a community, in order to control and prevent disease in the community. (CDC 2005)
3) The systematic collection, analysis and interpretation of the health data that is used to plan, implement, and evaluate public health programs. Also used to determine the need for public health action. (MERREA 2005)

RELATED TERMS: surveillance, disease surveillance

rate
1) An expression of the frequency with which an event occurs in a defined population. (CDC 2005)
2) In epidemiology,"rate" has special usage; it is the frequency with which an event occurs in a defined population, at or over a specified period of time. A rate is therefore a ratio, and includes proportions. (NZ 2002)

reference group
SEE: control group

respondent error
1) A type of non-sampling error caused by respondents intentionally or unintentionally providing incorrect answers to research questions. (ESOMAR 2001)
2) In surveys, a component of measurement error that results from the respondent deliberately or inadvertently answering incorrectly. (NIST/SEMATECH 2005b)

RELATED TERMS: survey

retrospective study
1) A kind of nonexperimental study in which all the phenomenon investigated occurs prior to the onset of the study. Further, the samples of retrospective studies are usually chosen by the value the responses take. T his latter point creates special conceptual issues regarding causality, and the composition of comparison samples (see matches) is especially important. Advantages of retrospective samples is that they allow one to investigate phenomena that are either unlikely or undesirable to occur in the future; further, since all key events occur in the past, retrospective studies can often be undertaken economically. (NIST/SEMATECH 2005b)
2) A study in which investigators select groups of patients that have already been treated and analyze data from the events experienced by these patients. These studies are subject to bias because investigators can select patient groups with known outcomes. (NLM/NICHSR 2004)

RELATED TERMS: bias, cohort study, retrospective study; *contrast with* prospective study

secondary attack rate
1) A measure of the frequency of new cases of a disease among the contacts of known cases. (CDC 2005)
2) The number of cases of an infection that occur among contacts within the incubation period following exposure to a primary case in relation to the total number of exposed contacts. (MERREA 2005)

RELATED TERMS: secondary transmission

secondary spread
SEE: secondary transmission

secondary transmission
Direct or indirect propagation of a pathogen from an infected person (with or without clinical illness) to additional people. (ILSI 2000)

seroepidemiology
An epidemiology study or activity based on serologic testing of characteristic change in the serum level of specific antibodies. Latent, subclinical infections and carrier states can thus be detected, in addition to clinically overt cases. (MERREA 2004)

specificity
Specificity of a screening test is the proportion of truly nondiseased persons who are so identified by the screening test. It is a measure of the probability of correctly identifying a nondiseased person with a screening test. (Last 1983)
RELATED TERMS: sensitivity

standardized mortality ratio
ACRONYM: SMR
1) This is the relative measure of the difference in risk between the exposed and unexposed populations in a cohort study. The SMR is similar to the relative risk in both definition and interpretation. This measure is usually standardized to control for any differences in age, sex, and/or race between the exposed and reference populations. It is frequently converted to a percent by multiplying the ratio by 100. (EPA 2003)
2) The ratio of observed deaths in a population to the expected number of deaths as derived from rates in a standard population with adjustment of age and possibly other factors such as sex or race. (RAIS 2004, SRA 2004)

surveillance
Systematic ongoing collection, collation, and analysis of data and the timely dissemination of information to those who need to know so that action can be taken. Surveillance is the essential feature of epidemiological practice. (MERREA 2005)
RELATED TERMS: public health surveillance, disease surveillance

survey
1) Surveys involve a (statistically) large number of interviews with respondents, using pre-designed questionnaires. (ESOMAR 2001)
2) A method of data collection that involves asking a fixed set of questions from selected individuals. Key issues involve questionnaire development, (ideally random) sample selection, and nonresponse management. (NIST/SEMATECH 2005b)

transmission of infection
1) Any mode or mechanism by which an infectious agent is spread through the environment or to another person. (CDC 2005)
2) Transmission of infectious agents. Any mechanism by which an infectious agent is spread from a source or reservoir to another person. Direct transmission is the direct and essentially immediate transfer of infectious agents to a receptive portal of entry through which human or animal infection may take place. This may be by direct contact such as touching, kissing, biting, or sexual intercourse, or by the direct projection (droplet spread) of droplet spray onto the conjunctiva or onto the mucous membranes of the eyes, nose, or mouth. It may also be by direct exposure of susceptible tissue to an agent in soil, compost, or decaying vegetable matter or by the bite of a rabid animal. Indirect transmission is by vector or air; the latter is subdivided into droplet or dust. (MERREA 2005)
RELATED TERMS: transmissible, secondary transmission

zoonoses

1) An infectious disease that is transmissible under normal conditions from animals to humans. (CDC 2005)
2) Diseases and infections that are naturally transmitted between vertebrate animals and humans. (CRCWQT 2002)
3) Infections in animals that can be transmitted to humans. (FDA 2001)
4) A disease that can be passed from animals, whether wild or domesticated, to humans. (MERREA 2005)
5) Diseases of humans transmitted from animals. (NZ 2002)
6) A human disease that originates from an animal. (Jones 2006)